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G. S. McCLOY
METHOD FOR CHARGING INDIVIDUAL CAPSULES
WITH A COMPRESSED GAS
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2,469,975

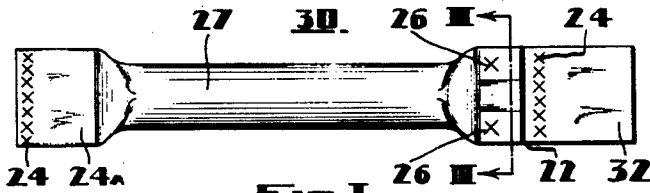


FIG. 1.



FIG. 3.

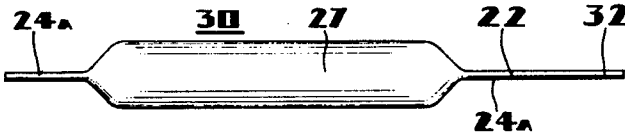


FIG. 2.

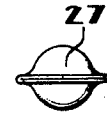


FIG. 4.

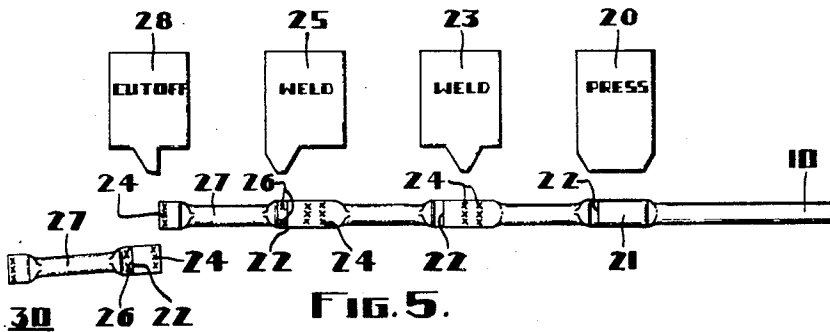


FIG. 5.

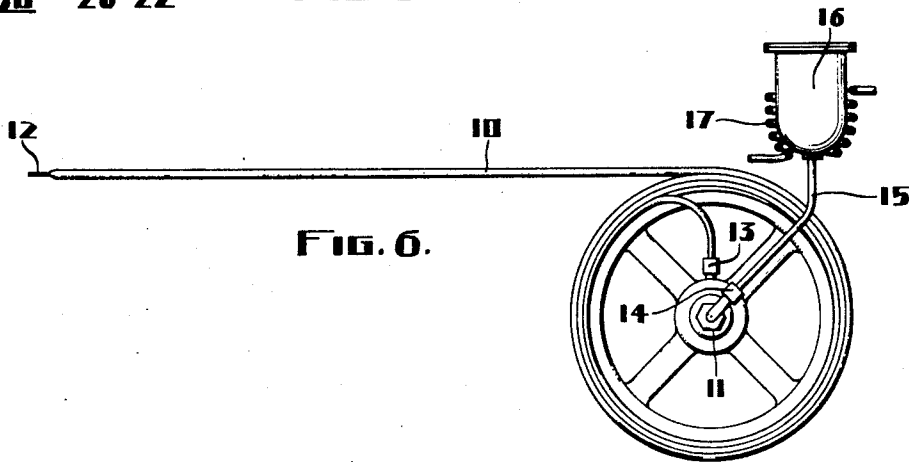


FIG. 6.

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METHOD FOR CHARGING INDIVIDUAL CAPSULES WITH A COMPRESSED GAS

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1 Claim. (Cl. 226—20)

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This invention relates to a method for charging individual capsules with a compressed gas. The invention further relates to the structure of the capsule formed by my new method.

The invention is particularly applicable to capsules of the type wherein the contents thereof are adapted to be discharged into the atmosphere while held by the user, the capsule being normally hermetically sealed and having a frangible portion to be broken off by the user to permit discharge of the contents.

In such capsules it is often desirable that the flow from the capsule be controlled at a predetermined rate in order that the discharged fluid shall have certain prescribed characteristics. This is particularly true when the capsule contains compressed gas in liquid form in which are dissolved certain insecticidal materials. In the latter case, it is desirable that the mixture form an aerosol or suspension of minute particles of the relatively non-volatile insecticide which remains suspended in the air for a considerable time after its discharge. To this end, it is desirable that the rate of discharge be controlled quite accurately.

Heretofore, in preparing such capsules it has been the practice to first form the individual capsule and then charge it by a rather complicated machine which automatically charges and also seals the capsule.

An object of the present invention is to provide a charging and sealing method and means wherein the compressed gas and any substance dissolved therein is first admitted to a relatively long, continuous tube sealed at one end, after which individual capsules of predetermined characteristics are formed and sealed from the charged tube.

A further object is to provide a capsule so formed which has the desired construction to permit proper aerosol formation if the nature of its contents so requires.

The foregoing and other objects are effected by the invention as will be apparent from the following description and claims taken in connection with the accompanying drawings, forming a part of this application, in which:

Fig. 1 is a plan view of a capsule formed according to my invention;

Fig. 2 is a side elevation of the capsule of Fig. 1;

Fig. 3 is a section taken on line III—III of Fig. 1 and showing the discharge orifice;

Fig. 4 is an end view of the capsule;

Fig. 5 is a schematic representation in plan

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view of the successive steps in the formation of the capsules from a continuous tube; and

Fig. 6 is a side elevation schematically showing the charging system.

According to my invention and referring to Fig. 6, a continuous tube 10 having a considerable length, on the order of several hundred feet, is coiled about a hollow axle 11. The tubing material will, of course, be determined by the nature of its charge, in that it should be strong enough to resist rupture under abnormal pressure conditions and it should also be non-corrosive with respect to its contents. In practice, I have used flexible steel tubing of approximately 0.500 inch outer diameter and 0.460 inch inner diameter where the contents comprised approximately 90 per cent of dichloro-difluoromethane as a propellant for an insecticide comprising a small per cent of pyrethrum extract with a suitable mutual solvent.

Before charging, the outer end of the tube is hermetically sealed, as indicated at 12. The inner end of the tube is connected by a suitable sealed coupling 13 to the rotatable shaft 11 and the end of that shaft is connected by a suitable sealed coupling 14 to a conduit 15 which is in turn connected to a closed tank or pressure vessel 16 containing the charging mixture. Heating means, here indicated as a pipe coil 17, should be provided to maintain the temperature of the tank 16 at a predetermined degree over that of the tubing 10, to ensure fluid flow from the tank to the tube. The fluid-tight coupling 14 between the stationary conduit 15 and the hollow rotating shaft is not described in detail as such connections are well-known in the art.

In describing the steps of forming the individual capsule, let it be assumed that the tube 10 in Fig. 6 is fully charged with a suitable compressed gas, with or without added substances. Now, referring to Fig. 5, a suitable tool 20 simultaneously presses a portion of the tube 10 together, as indicated at 21, and also scores the tube, as indicated at 22, at the outer end of the pressed portion. Next the tube is contacted at the flattened portion by a welding machine 23, which forms two welded portions 24 somewhat near the center of the flattened portion but spaced apart. These welds extend completely across the flattened portion and form two hermetic seals. Next the tube is contacted by a welding machine 25 which forms one or more spot welds 26 adjacent the edges of the flattened portion between the scored portion 22 and the main body of the capsule 27. Finally the flattened

portion is contacted by a cutting tool 28 between the two welded portions 24 so that the flattened portion is separated at this point, resulting in the formation of the individual capsule 30.

It should be noted that the spot welds 26 do not completely close the space between the main body 27 of the capsule and the scored portion 22, but only serve to reduce the area of this space to provide a restricted flow passage 31 (Fig. 3) from the body of the capsule to the atmosphere when the end of the capsule is broken off at the scored portion 22. This weld may be of any type which does not completely close the flattened portion at this point, and is of such a character as to leave a passage of sufficient area to provide the desired flow characteristics as determined by the nature of the material to be discharged. The flattened portions 24a lying between the sealed ends 24 and the main body portion 27 offer a safety feature in that they provide sections which will expand under the influence of pressure of the contents due to any increase in temperature above that at which the capsule was charged.

It should also be noted that during the formation of the individual capsules from the charged coil or tubing, any of the charge displaced by the various steps is forced back into the storage tank 16.

In use, the capsule of Fig. 1 is grasped in one hand and the end portion 32 is flexed by the other until that portion is broken off at the scored portion 22, whereupon the contents are discharged through the orifice 31. For an effective aerosol formation, it is preferable that the capsule be tilted downwardly toward the frangible portion 32 during discharge.

The capsule, of course, need not contain insecticidal material, but may be used for the discharge of many substances including perfumes, deodorants, disinfectants, repellents or any material which may be discharged from a closed container by a compressed gas.

In the manufacturing steps, it is understood that the charged tubing may move continuously to aligned stamping and welding machines, or may be moved intermittently as the individual capsules are formed at a single station by a machine which itself moves to perform the successive steps.

While I have shown my invention in but one form, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various changes and modifications without departing from the spirit thereof.

What I claim is:

The method of charging and forming individual capsules from a continuous tube, which method comprises sealing one end of the tube, supplying a fluid under pressure to the other end of the tube to completely fill the tube with the charging mixture, flattening a portion of the tube a predetermined distance from the end thereof, scoring the flattened portion adjacent the end thereof, welding the flattened portion beyond the scored portion to form an hermetic seal, partially welding the flattened portion between the body of the tube and the scored portion so as to leave a restricted passageway, and severing the formed capsule beyond the hermetically-sealed welded portion.

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